User manual

ADA-4028LA

Addressable RS485/422 to 2-WIRE Current Loop CLO Baud Rate Converter

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1. GENERAL INFORMATION

Thank you for your purchase of **CEL-MAR Company** product. This product has been completely tested and is covered by a two year warranty on parts and operation from date of sale.
If any questions or problems arise during installation or use of this product, please do not hesitate to contact Technical Support at +48 41 362-12-46 or e-mail support@cel-mar.pl.

1.1. WARRANTED INFORMATION

The **ADA-4028LA** converter is covered by a two year warranty from date of sale. In case of being damaged it will be repair or the damaged component will be replace. The warranty does not cover damage caused from improper use, materials consumption or any unauthorized changes. If the product does not function (is damaged), or not operate in accordance with the instructions, will be repaired or replaced.
All warranty and no warranty repairs must be returned with paid transport and insuring to the **CEL-MAR Company.**
CEL-MAR Company under no circumstances won't be responsible for ensuing damage from improper using the product or as a result of random causes: the lightning discharge, the flood, the fire and the like.
CEL-MAR Company is not be held responsible for damages and loss including: loss of profits, loss of data, pecuniary losses ensuing from using or the impossibility of using this product.
In specific cases CEL-MAR Company discontinue all warranties and in particular do not follow the user manual and do not accept terms of warranty by the user.

1.2. GENERAL CONDITIONS FOR SAFE USE

The device should be installed in a safe and stable places (eg, electroinstallation cabinet), the powering cable should be arranged so as not to be exposed to trampling, attaching, or pulling out of the circuit.
Do not put device on the wet surface.
Do not connect devices for nondescript powering sources,
Do not damage or crush powering wires.
Do not make connection with wet hands.
Do not adapt, open or make holes in casings of the device!
Do not immerse device in water or no other liquid.
Do not put the fire opened on device sources: candles, an oil lamps and the like.
Complete disable from the supply network is only after disconnecting the power supply circuit voltage.
Do not carry out the assembly or dis-assembly of the device if it is enabled. This may result to short circuit and damage the device.

1.3. CE LABEL

CE symbol on organizing the company CEL-MAR a conformity of the device to the directive of the electromagnetic EMC 2004/108/WE compatibility means (Electromagnetic Compatibility Directive). The declaration of the agreement is accessible through the contact with the technical service at the address e-mail: serwis@cel-mar.pl or on the phone at the +48 41 362-12-46.

1.4. ENVIRONMENTAL PRESERVATION

This sign on the device inform about putting expended device with other waste materials. Device should send to the recycling. (In accordance with the act about the Electronic Appliance Expended from day 29 of July 2005)

1.5. SERVICE AND MAINTENANCE

The ADA-4028LA converter does not require the servicing and maintenance.
Technical support is available at number +48 41 362-12-46 in 8.00-16.00, from Monday to Friday.

2. PRODUCT INFORMATION

The converter is delivered with the user manual, resistors: Rt=120Ω (2 pcs.), Rd = 220Ω (1 pcs.) and 120Ω (1 pcs.), CD-ROM with ADAConfig software.

2.1. PROPERTIES

- Possibilities of adding the address to no-addressable device, connected to Current Loop CLO port.
- The conversion of parameters and baud rate on RS485/422 and CLO ports of the converter ,
- Operating on 2-wire bus in Current Loop standard,
- Operating up to 4 devices on Current Loop bus,
- Operating on 2-wire or 4-wire bus in point-to-point and multipoint topology,
- Operating up to 32 devices on RS485 bus,
- The baud rate (bps) on Current Loop CLO: 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200,
- The Current Loop CLO data format :
  - number of data bites: 5, 6, 7, 8,
  - parity: None, Odd, Even,
  - number of stop bits : 1, 2,
- The baud rate (bps) on RS485/422: 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 76800, 115200, 230400,
- The RS485/422 data format:
  - number of data bites: 5, 6, 7, 8,
  - parity: None, Odd, Even,
  - number of stop bits : 1, 2,
- Transparent for all protocols which data format is in accordance with the above specifications of Current Loop and RS485/422 interfaces,

- Power supply 10 - 30 VDC stable,
- 3kV= optoizolation in signal channel between Current Loop interface and RS485/422 interface,
- 1kV= or 3kV= galvanic isolation between RS485/422 interface and power supply,
- 1kV= or 3kV= galvanic isolation between Current Loop CLO interface and power supply,
- Implemented short circuit protection and over-voltage protection on the lines RS485/422 interface,
- Implemented short circuit protection and over-voltage protection on the lines Current Loop interface,
- Protection against power supply reverse connection,
- Connection of RS485/422 bus and power supply via screw terminal block, cross section up to 2.5 mm^2,
- Connection of Current Loop CLO via screw terminal block, cross section up to 2.5 mm^2,
- DIN 43880 standard - mounting in typical electro-installation unit,
- Rail mounting according to DIN35 / TS35 standard,
- Dimensions (W x D x H) 53mm x 58mm x 90mm.

2.2. DESCRIPTION

The ADA-4028LA addressable baud rate converter is device solving the problem of connecting no addressable devices equipped with the Current Loop CLO interface to multipoint RS485/422 bus by adding the address to the no-addressable device. At the same time the converter converts RS485/422 standard to Current Loop CLO standard with possibility of changing the baud rate and format of the transmitted data. Depending on the configuration can be set the baud rate, number of data bites, parity (None, Odd, Even) and number of stop bits. The setting can be different for Current Loop CLO port and RS485/422 port.
The ADA-4028LA supports the asynchronous baud rate up to 230,4 kbps via one or two pairs of twisted-pair cables of RS485/422 interface, and up to 19,2 kbps on 2-wire Current Loop CLO bus.
The ADA-4028LA converter with active transmitter allows connection to the RS485/422 bus devices with passive Current Loop CLO interface eg. energy meters like POZYTON LZQM, ELSTER A1500, PAFAL and others, with possibility of conversion the format and baud rate between connected devices to Current Loop CLO interface and RS485/422 bus.
The ADA-4028LA is equipped with screw terminal block for connection of RS485/422, Current Loop CLO and power supply. Over-voltage protection on each RS485/422 lines and Current Loop, was made on the base over-voltage LED's and the fuses. To RS485/422 bus created by the use ADA-4028LA, is possible to connect 32 devices, operating in half duplex mode (query /response) on 2 or 4 wires multipoint bus or full duplex on 4-wire bus. To Current Loop CLO bus created by the use ADA-4028LA (active), is possible to connect 4 devices operating in half duplex mode.

The converter has an internal low-energy surge protection for each line of Current Loop CLO interface. However, for the lightning protection should be used external lightning arresters such as the typical phone line protection.

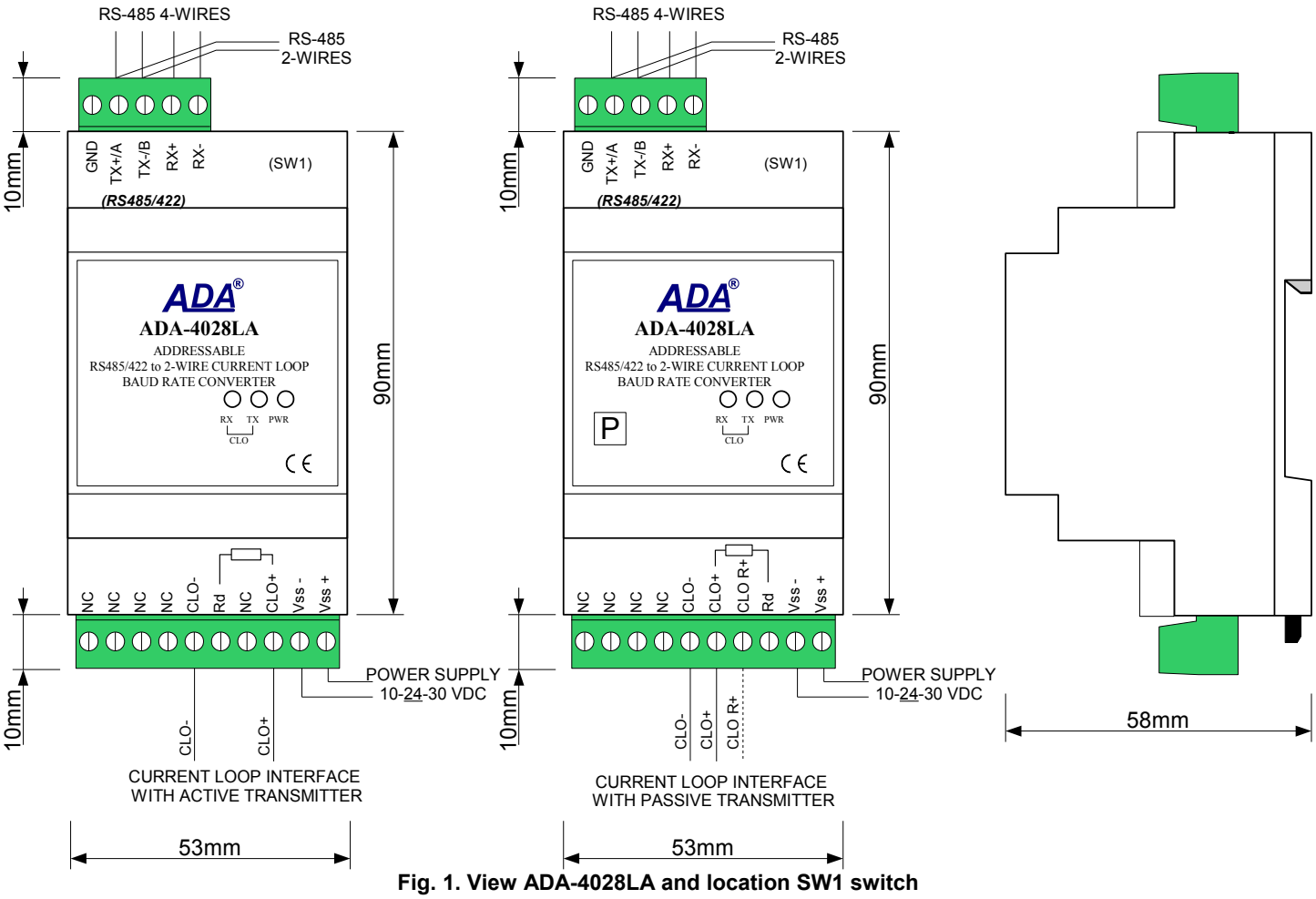

Fig. 1. View ADA-4028LA and location SW1 switch

2.3. CURRENT LOOP TRANSMITTER & RECEIVER

The converter ADA-4028LA is produced with active or passive Current Loop transmitter.
The converter with Current Loop active transmitter has the transmitter on base power source generating the 0-20mA or 0-30mA (depend on version) and passive receiver comprising the optocoupler. ADA-4028LA with Current Loop passive transmitter has the transmitter on base power source generating the 20mA or 0-30mA (depend on version) and passive receiver comprising the optocoupler.

2.4. ISOLATION

Converter ADA-4028LA has 3-way, 1kV= or 3kV= galvanic isolation (depend on version, described in section VERSIONS).

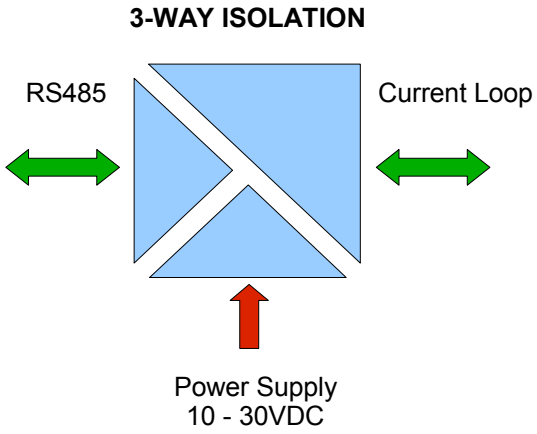

Fig. 2. Isolation diagram

3. INSTALLATION

This chapter will show how to connect ADA-4028LA to RS485 bus, Current Loop line and power supply and how to use it.
To reduce disturbance from environment, it is recommended to:

- use multipair type shielded cables, which shield can be connected to the earthing on one end of the cable,
- use the suitable diameter cable for power supply on account of voltage drop,
- use the powering cable with a suitable section because of the voltage drops,
- use the interference eliminators for powering the converter,
- lay signal cables at a distance of not less than 25 cm away from power cables,
- not powering the converters form the power-circuit of devices generate large impulse disturbance like contactors, relays, inverters.

3.1. ASSEMBLING

ADA-4028LA converter case is adapted to assembly on TS-35 (DIN35) rail. To install converter should mount device on the rail upper part of the case then press bottom part to to hearing characteristic „Click” sound.

3.2. CONNECTION TO PC

The ADA-4028LA can be connected to RS232 port or USB of PC by the use of additional converter eg. RS232 to RS485 (ADA-1040) or USB to RS485 (ADA-I9140). The connection is made via RS485 bus or RS422 bus, as on the figure bellow.

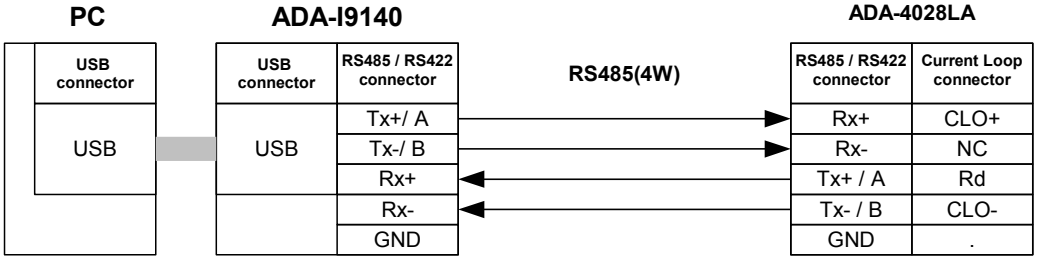

Fig. 3. The 4-wire connection of ADA-4028L to PC by the use of USB to RS485/RS422 converter ADA-I9140/ADA-I9141

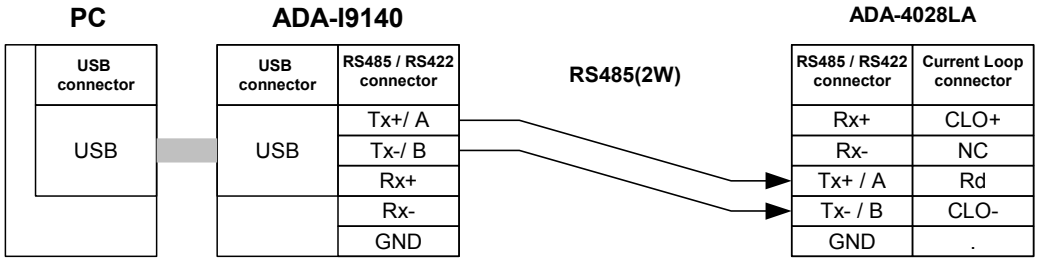

Fig. 4. The 2-wire connection of ADA-4028L to PC by the use of USB to RS485/RS422 converter ADA-I9140/ADA-I9141

3.3. CONNECTION TO RS485/422 BUS

The RS485/RS422 interface at ADA-4028LA converter is available on terminal block described as: Tx+/A, Tx-/B, Rx+, Rx-. Below are shown connection of ADA-4028LA converter to RS485(4W) bus and RS485(2W) bus.

3.3.1. CONNECTION TO RS485 (4-WIRE) BUS

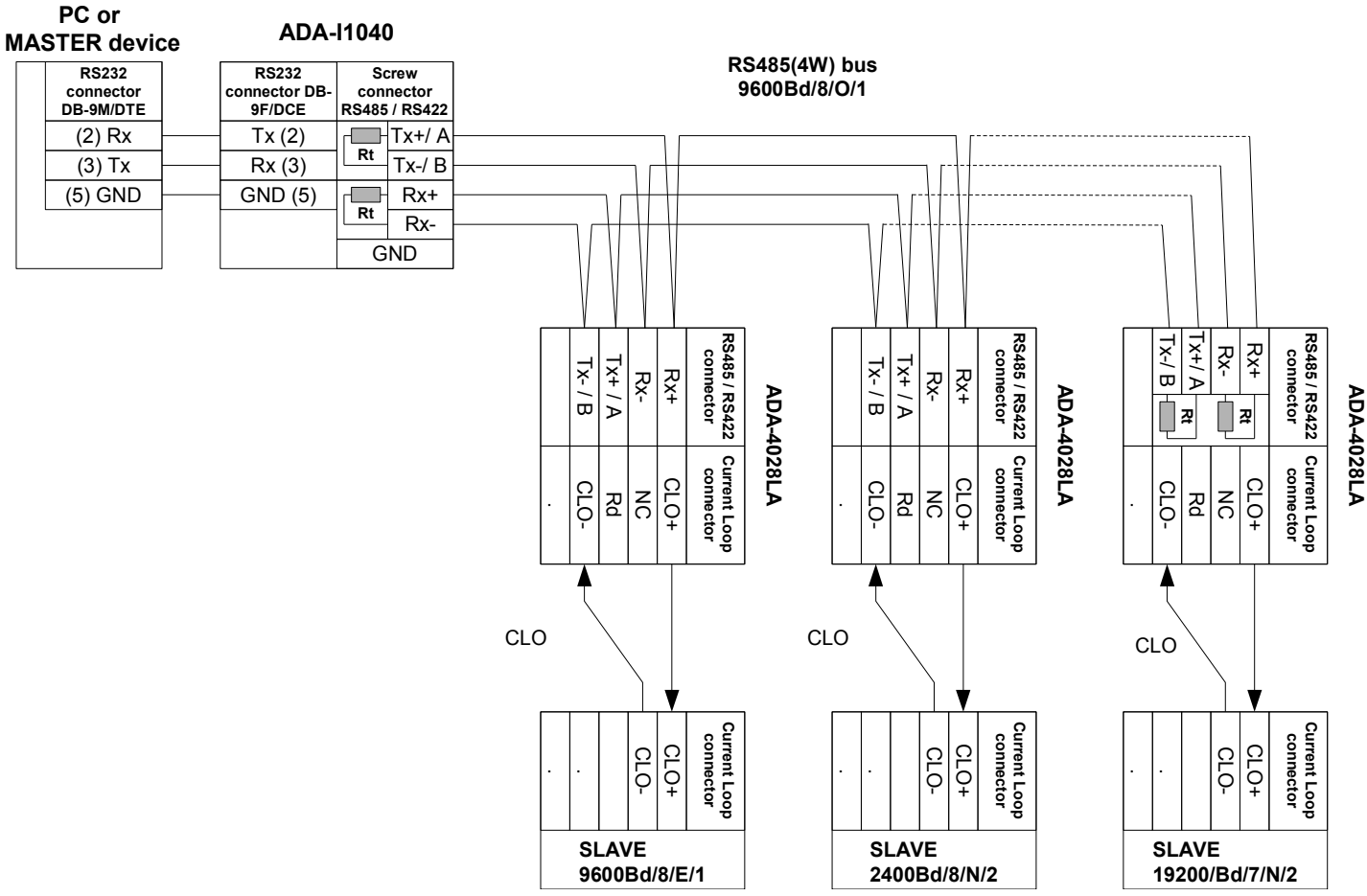

Fig. 5. Example connection of ADA-4028LA to RS485(4W) 4-wire bus and galvanic separation of SLAVE device

3.3.2. CONNECTION TO RS485 (2-WIRE) BUS

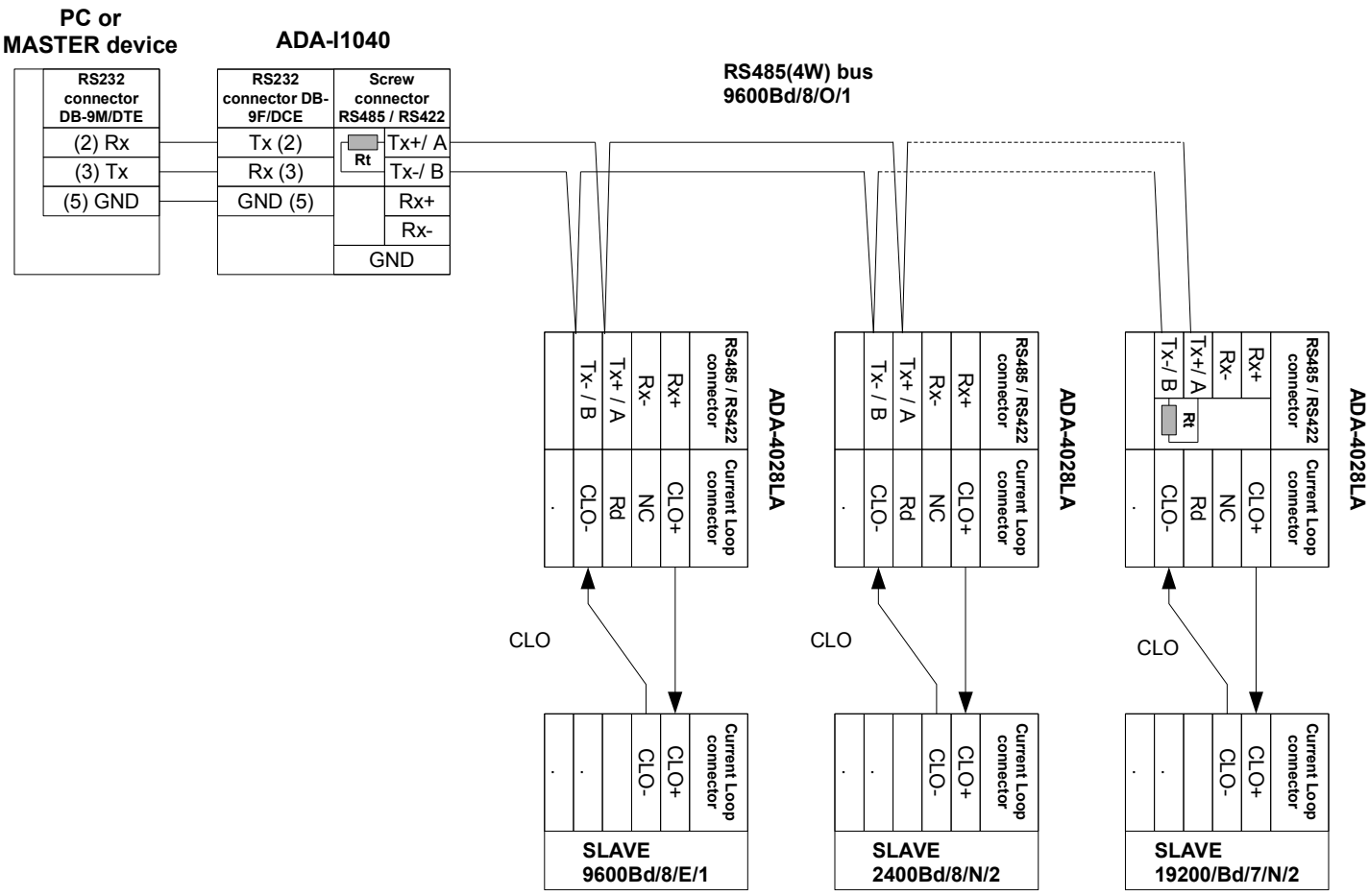

Fig. 6. Example connection of ADA-4028LA to RS485(2W) 2-wire bus and galvanic separation of SLAVE device

3.3.3. LINE TERMINATION

The application of Line Termination (terminator) Rt = 120 ohms will reduce electrical reflection in data line at high baud rate. It is not needed below 9600Bd. The Line Termination resistor should be used if the distance is over 1000m @ 9600Bd or 700m @ 19200Bd transmission, the resistor can be necessary if there are problems with the transmission correctness. Example connection of Rt are shown on Fig. 5 & 6. Resistor Rt = 120 Ω, 5%, 0.25W of a 2 pc. is complete with the device ADA-4028LA.

3.3.4. CONNECTION OF CURRENT LOOP DEVICES

The connections of SLAVE devices with current loop CLO interface to ADA-4028LA are shown on Fig..5 & Fig..6.
Current Loop CLO interface at ADA-4028LA converter is available on terminal block described as: CLO+, CLO-, Rd.
Rd & CLO+ clamp is used also for connection of additional resistor for sensitivity setting of CLO receiver (see pt. 4.2).

3.3.4.1. CONNECTION OF DEVICE WITH PASSIVE INTERFACE CLO

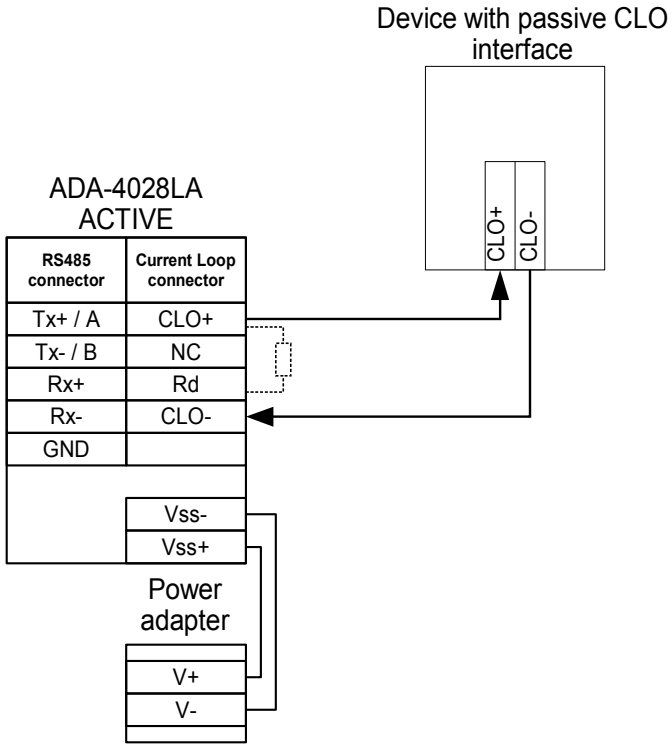

Fig. 7. Example connection of device with passive CLO interface eg. energy counter to ADA-4028LA

3.3.4.2. CONNECTION OF DEVICE WITH ACTIVE INTERFACE CLO

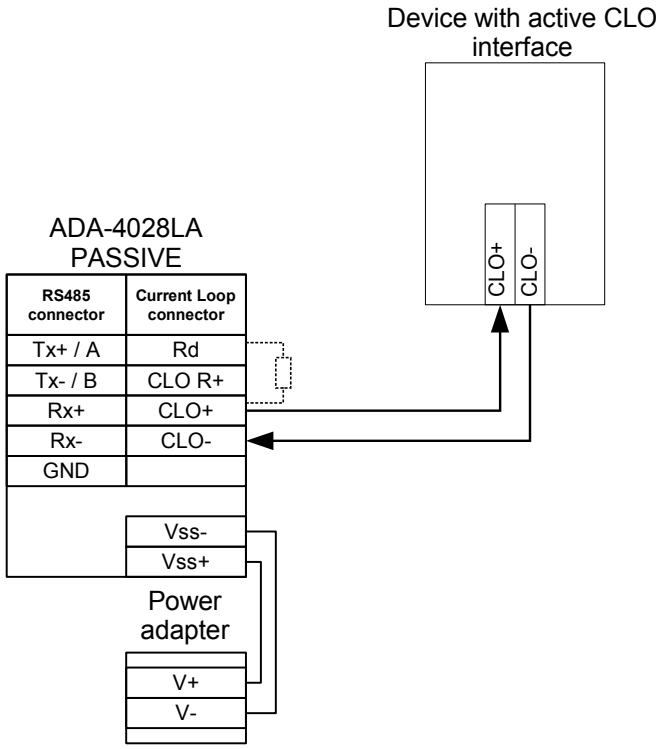

Fig. 8. Example connection of device with active CLO interface to ADA-4028LA

3.3.4.3. CONNECTION OF 4 DEVICES WITH THE PASSIVE CLO INTERFACE

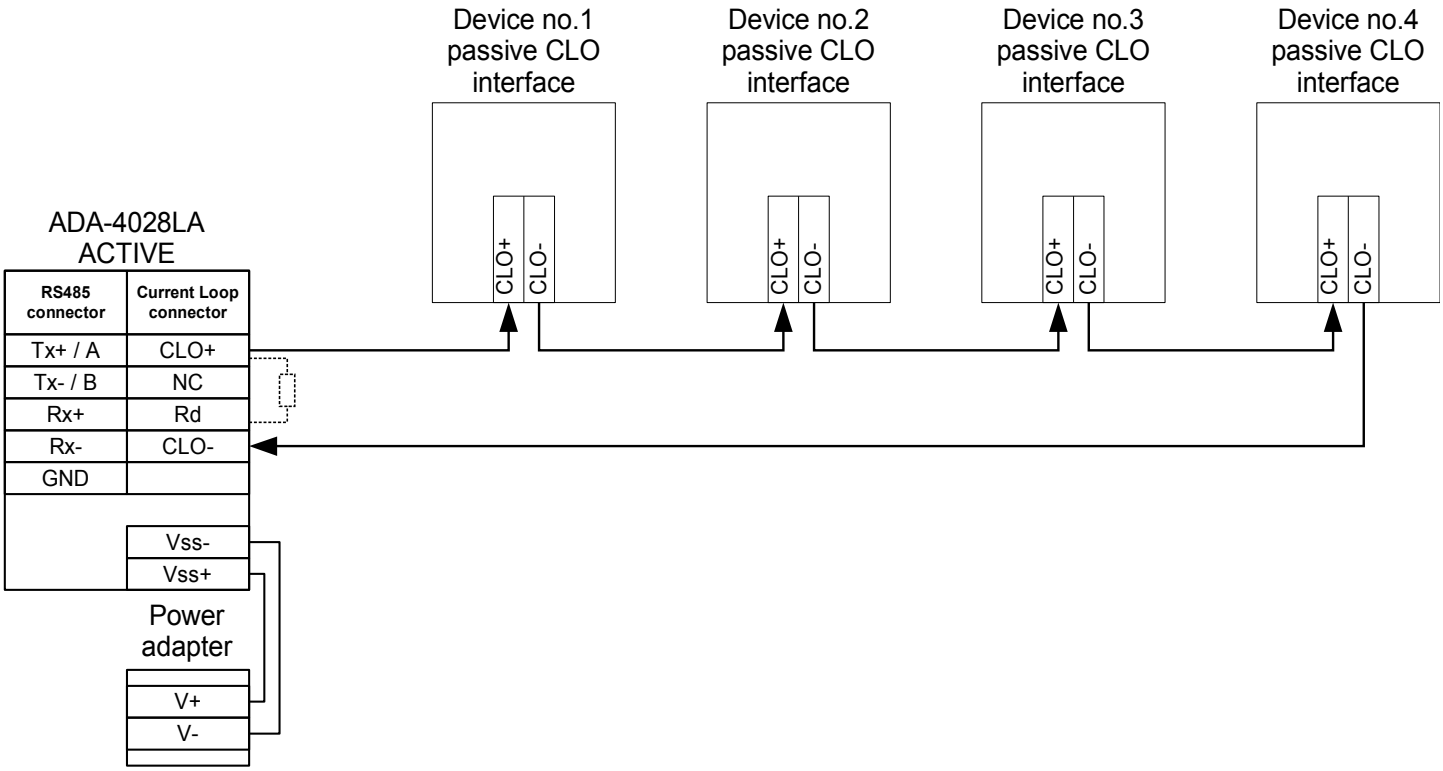

Fig. 9. Example connection of 4 devices with passive CLO interface eg. energy counters to ADA-4028LA

3.4. POWER SUPPLY

The power supply to ADA-4028LA should be DC (regulated) from the scope 10 V= to 30V= and nominal power more then 2W. The power cable from DC power supplies to the device must not be longer than 3m. Observe the polarity, connect positive (+) of DC power supplies to Vss+ and negative (-) end to Vss- terminal. The ADA-4028LA has the protection from opposite connection power supply.
If after power, on the front panel is not lit green LED PWR, check the power connection (polarity).

4. STARTUP

Converter can be powered after proper connection according to steps above.
If connection was made properly green LED PWR on front panel of converter should light, if not check polarization of power connection and if RX LED is lighted check connection correctness of Current Loop CLO transmitter circuit. Lighting this LED indicates non flow of current through optocoupler in receiver circuit.
During correctness data transition via the converter the LEDs Tx and Rx should blinking.

4.1. SIGNALING LEDS

LED	***Description***
PWR	Signalling of Power Supply
Standard mode	
RX	Signalling of data receiving through the ADA-4028LA converter from Current Loop CLO port
TX	Signalling of data transmitting from the ADA-4028LA converter through Current Loop CLO port
Configuration mode	
LED by SW1	Blink with frequency 1 Hz - signalling of configuration mode (see micro-switch SW1 setting)
Firmware update mode	
LED by SW1	Blinking signalling the software data flows to converter.

4.2. SENSITIVITY SETTING OF CURRENT LOOP CLO RECEIVER

Devices with a passive interface CLO may have different current values in the logical zero state, therefore should be set the converter receiver sensitivity. Wrong adjustment of receiver sensitivity is revealed by not lit of RX LED during data receiving from connected devices (eg. energy counter) despite the correct connections to converter. The sensitivity is set by adding additional resistor to Rd and CLO+ screw terminal block. If the resistor is correct RX LED will be blinking during data receiving. ADA-4028LA converter is supplied with resistors Rd = 220Ω / 0,25W and 120Ω / 0,25W.

5. CONFIGURATION

5.1. OPERATION MODE

The ADA-4028LA converter can operates in a few modes :

- standard mode,
- configuration mode,
- emergency firmware update mode,

Those modes can be set by use SW1 located by terminal block RS455/RS422. To set the switch section, should remove terminal cover marked as SW1 and make the appropriate settings by the use a small, flat screwdriver.
Figure 1 present the location of two-position SW1 micro-switch inside ADA-4040A.
All available adjusting the SW1 switch are shown in table below.

Table 1. Converter operation modes

SW1- 1	***SW1- 2***	***Mode***
OFF	OFF	Standard operation
OFF	ON	Factory default
ON	OFF	Device configuration
ON	ON	Emergency Firmware Update

5.2. SOFTWARE CONFIGURATION

The configuration of ADA-4040A converter can be made by the use of *ADAConfig* Software - selling with converter.
To make the configuration, connect converter to computer (see pt. 3.2) and power supply. If after power, on the front panel is not lit green LED PWR, check the power connection (polarity). If the PWR LED lights, set the section of SW1 switch to configuration mode as in table below.

SW1-1	***SW1-2***
ON	OFF

In the configuration mode the yellow LED located by SW1 micro-switch will blink with frequency 1 Hz. Start the ADAConfig Software and make the configuration of transmission parameters for each converter interfaces and set his visible address from RS485 bus. First should be set the number of COM port for communication with the converter, then readout the configuration from ADA-4028LA memory using the button ***[Read converter configuration]*** and make the proper changes of interface setting. If the option Addressing Converter will be set, on configuration window should be set proper converter address from range 1 - 255. If this option is OFF the converter will function as baud rate converter.
In both cases, is possible to set additional transmission parameters for Current Loop CLO interface and RS485/422 as below:
– baud rate on RS485/422 bus (kbps): 0.3, 0.6, 1.2, 1.8, 2.4, 4.8, 7.2, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 76.8, 115.2, 230.4,
– baud rate on Current Loop bus (kbps): 0.3, 0.6, 1.2, 1.8, 2.4, 4.8, 7.2, 9.6, 14.4, 19.2,
– number of data bites: 5, 6, 7, 8,
– control parity: no control, parity control, control of none parity,
– number of stop bits : 1, 2,
– frame spacing – range from 1 to 255 (time silence as frame's end),
After configuration the setting should be saved on converter memory by using button ***[Write converter configuration].***
Return to work in standard mode is made by using SW1 switch (yellow LED blink OFF) as below.

SW1-1	***SW1-2***
OFF	OFF

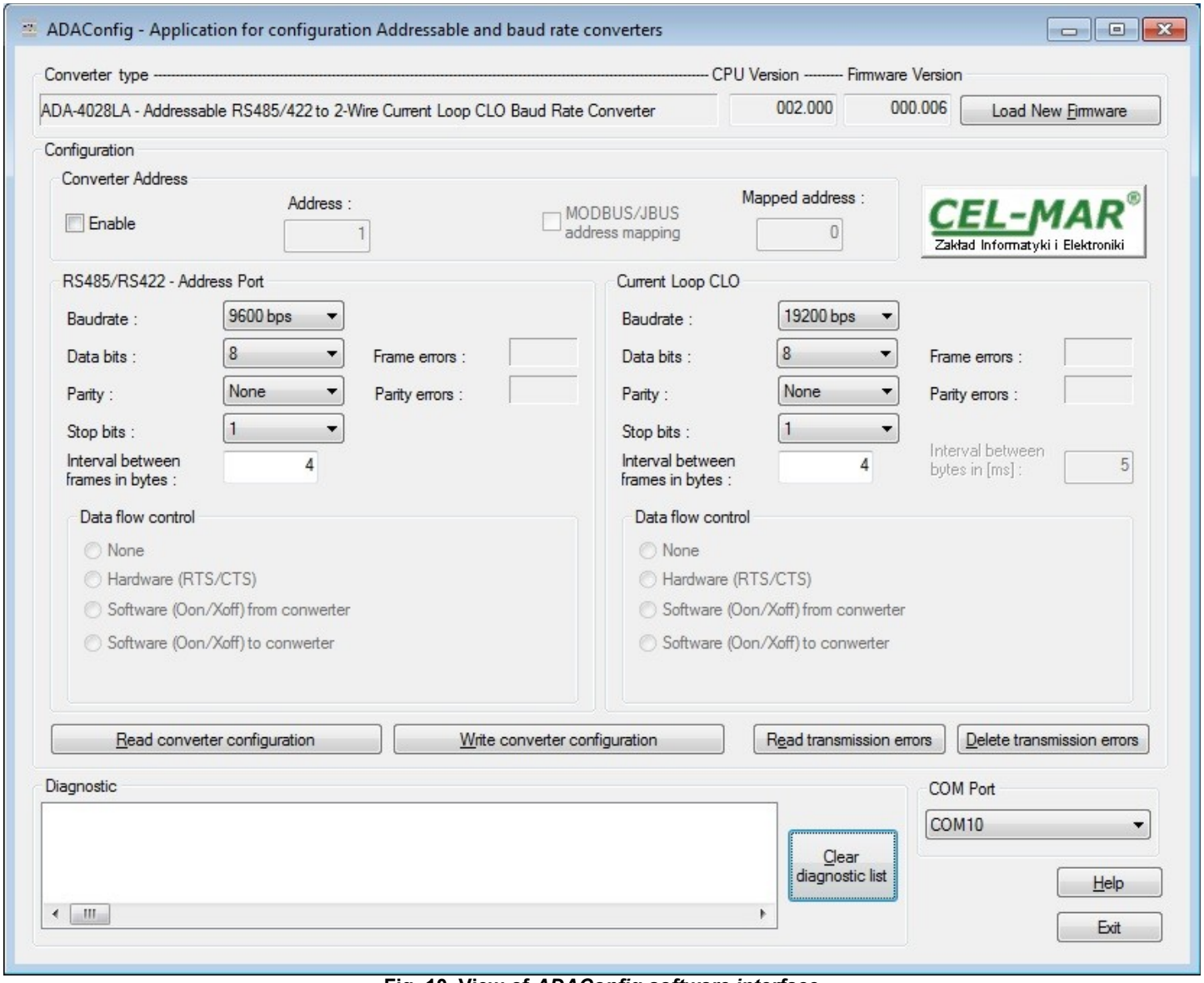

Fig. 10. View of *ADAConfig software interface*

5.3. FIRMWARE UPDATE

Set SW1 micro switch to configuration mode as in table below.

SW1-1	***SW1-2***
ON	OFF

In the configuration mode the yellow LED will blink with frequency 1Hz. Press a button ***[Load New Firmware]*** to change the software delivered by manufacturer. The Select File window will open (Fig.11) and select the *.bin file then click ***[Open]*** - software will be load to *ADAConfig* buffer storage and will be checked. If the *ADAConfig* not detect errors in loaded file, change converter software. Process of updating is visualized by *ADAConfig* in use Progress Window and after proper changing confirmed by correct message.

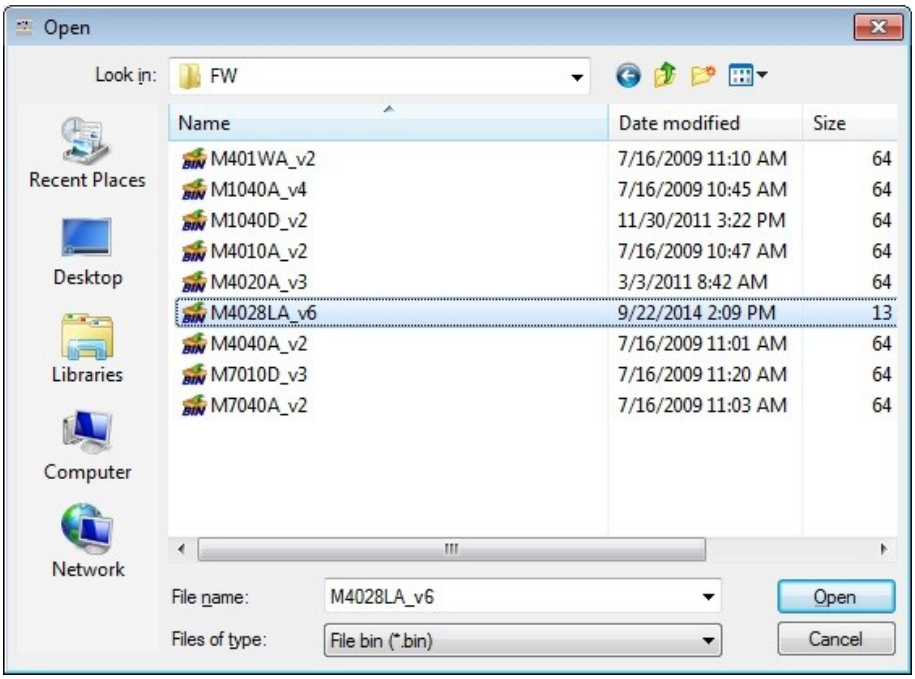

Fig. 11. Selection of firmware file

During loading software the yellow LED located beside SW1 micro-switch will blinks, showing data flow to the converter. If the software was loaded correctly yellow LED will be blink with frequency 1 Hz.
After that set micro switch SW1 to standard mode as shown in the table below.

SW1-1	***SW1-2***
OFF	OFF

Yellow LED will be OFF

5.4. EMERGENCY FIRMWARE UPDATE

In case of the unsuccessful update of the converter software, try again according to description in point 5.3. If the update is still incorrect use emergency firmware update. Set SW1 microswitch mode as in the table below.

SW1-1	***SW1-2***
ON	ON

After micro-switch setting, should be restarted the ADA-4028LA, by turning OFF and then ON the power supply. The yellow LED will light continuously and the converter will be in Emergency Firmware Update mode. Now follow the description in point 5.3.

ATTENTION!
AFTER SUCCESSFUL UPDATING SET SW1MICRO-SWITCH AS IN TABLE BELOW

SW1-1	***SW1-2***
OFF	OFF

5.5. FACTORY DEFAULT SETTING

In case of faulty functioning the ADA-4028LA, can be restored the factory default setting of the converter internal registers.
Set SW1 microswitch mode as in the table below

SW1-1	***SW1-2***
OFF	ON

Disconnect the power and after while connect again the power. After that, will be loaded the factory default setting to the converter internal registers.
After this operation, the converter parameters should be set again for operating in the application.
Set micro switch SW1 to standard mode as shown in the table below.

SW1-1	*SW1-2*
OFF	OFF

5.6. DATA TRANSMISSION DIAGNOSTICS

To readout diagnostics should be set SW1 microswitch to the configuration mode (see pt. 3.1.1).
Correctness of transmission proceed on Current Loop interface and RS485/422 interface can be checked by readout the errors list by *ADAConfig* Software form the converter memory. Frames error counter will be increased, in case of: improper speed set compared to real speed of data transmission. Parity error counter will be count the errors which can arise in case of misrepresent bytes in transmitted sign. This counter will not works in case of disable control parity. To check those counters press the button ***[Read transmission errors],*** and to delete (zeroing of counters in the memory of the converter) press ***[Delete transmission errors].***
In case of parity errors or frame errors, should be checked the ADA-4028LA converter's configuration and correctness connection of RS485 bus and Current Loop device to the converter ports.
After finishing the diagnostics, the SW1 micro-switch should be set to standard mode as shown in the table below

SW1-1	*SW1-2*
OFF	OFF

Yellow LED will be OFF

6. OPERATION

The ADA-4028LA converter can operate in to two modes: not addressable and addressable.

6.1. OPERATION IN NON ADDRESSABLE MODE

In this mode the ADA-4028LA operates as baud rate converter and data format converter and lets to set different baud rates and data format on Current Loop CLO & RS485/422 interfaces.
It lets connect to RS485 network old devices operate with non-configure baud rate and data format, on which operate devices with different baud rate or data format.

6.2. OPERATION IN ADDRESSABLE MODE

In this mode ADA-4028LA operate as baud rate converter and data format converter and lets to connect no addressable devices with Current Loop CLO interface, transmitting data at different rates and formats of data frame to the RS485 bus, in the process of enabling the cooperation with addressable devices.
Example connection of ADA-4028LA is shown on fig. 12.
On RS485 bus the frame of protocol for no addressable devices connected to Current Loop CLO port of ADA-4028LA should be created in the following way:

ADDRESS ADA-4028LA	*FRAME OF NO ADDRESSABLE DEVICES*

Where:

ADDRESS ADA-4028LA - one byte of address from 1-255 scope, - set in the memory of ADA-4028LA during configuration in use of *ADAConfig,*

FRAME OF NO ADDRESSABLE DEVICES - free sequence of bytes containing the appropriate frame of device, connected to Current Loop CLO port. Not longer than 950 bytes.

ADA-4028LA converter with set up addressing is listening constantly to frame on RS485 bus via RS485/422 port. If received frame contains byte of address equal to address of converter, then another bytes of frame are received, right up to silence on RS-485 bus equal to 'space between frames in signs'. If the frame is received correctly, the address byte is deleted and transmitted over as typical to the Current Loop CLO port. In case of errors in received frame, it isn't transmitted to the Current Loop CLO. In this case should be send the previous frame one more.

The frame received from device connected to Current Loop CLO port is being tested of transmission errors and in case of their missing the converter adds address to the beginning of frame and send it to RS485/422 bus through RS485/RS422 port. Frame containing errors isn't being transmitted to RS485/422 port. In case of transmitting of frames containing more than 950 bytes converter receive only 950 bytes and next are ignored. ADA- 4028LA has equipped with separate buffers for RS485/422 and Current Loop CLO, therefore converter can operate in full duplex mode on RS-422 and RS-485 4-wire bus.

On a picture below are shown the possibilities of using the addressable ADA-4028LA baud rate converter.

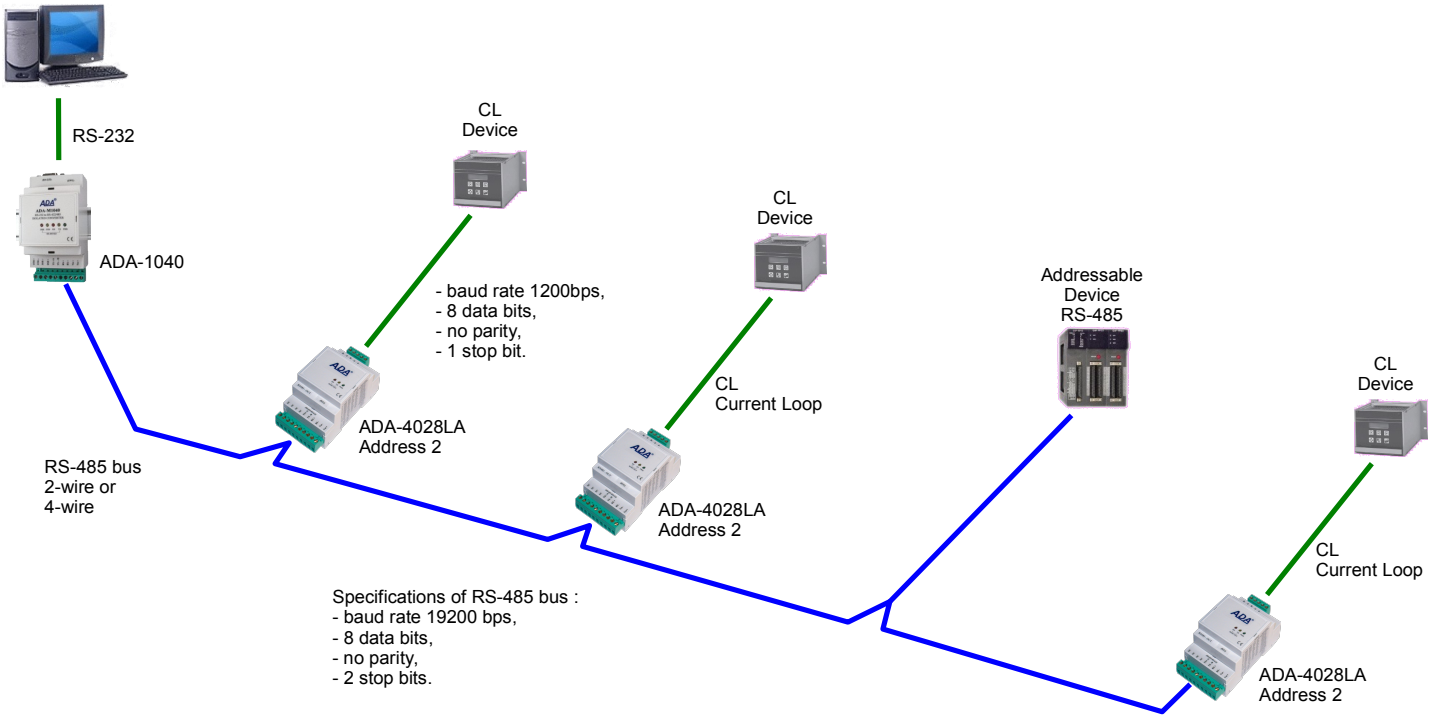

Fig.12. Connection of no addressable devices with Current Loop CLO interface to RS485/422 bus

7. VERSIONS

ADA-4028LA -		**-**	
Current Loop voltage:			
24VDC / 0-20mA, active transmitter of Current Loop	**1**		
12VDC / 0-20mA, active transmitter of Current Loop	**2**		
24VDC / 0-30mA, active transmitter of Current Loop	**3**		
12VDC / 0-30mA, active transmitter of Current Loop	**4**		
24VDC / 0-20mA, passive transmitter of Current Loop	**1P**		
12VDC / 0-20mA, passive transmitter of Current Loop	**2P**		
24VDC / 0-30mA, passive transmitter of Current Loop	**3P**		
12VDC / 0-30mA, passive transmitter of Current Loop	**4P**		
3-way Galvanic isolation:			
1kV=			**2**
3kV=			**3**

Order example:
Product Symbol: **ADA-4028LA-1-2**
1 – 24VDC/0-20mA current loop, active transmitter,
2 – 1kV=, 3-way galvanic isolation.

8. SPECIFICATION

Transition Parameters		
	RS-485/RS-422	**Current Loop**
Connector	Screw terminal, wire max. Ø 2,5mm^2	Screw terminal, wire max. Ø 2,5mm^2
Line length	Up to 1200 m	Depends on baud rate up to 1000 meters
Maximum number of connected device	Up to 32	1
Maximum baud rate	230,4 kbps	19,2 kbps
Transmission line	Twisted cable 1-pair or 2-pair , UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5(24AWG).	2-pair twisted cable, UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5(24AWG).
Transmission type	Asynchronism full duplex, half duplex.	
Standards	EIA-232, CCITT V.24, EIA-485, CCITT V.11	
Optical signalisation	• PWR – green LED power supply, • RX - red LED data receiving from Current Loop, • TX - yellow LED data transmission through Current Loop CLO.	
Nominal Operating Conditions		
Power requirements	10 - 24 – 30 V DC	
Power Cable	Recommended length of power cable – up to 3m	
Power	2W	
Protection from reverse power polarization	YES	
Galvanic Isolation	1kV= or 3kV= DC between power circuit and RS485/422 signal line	
Optoisolation	3kV= between signal line RS-485/422 and Current Loop	
Operating temperature	0 ÷ +23 ÷ +50°C	
Humidity	5 ÷ 95% - non-condensing	
Position during operation	Free	
Mounting	Rail mounting according to DIN35 standard / TS35.	
Electromagnetic compatibility	Resistance to disruptions according to the standard PN-EN 55024. Emission of disruptions according to the standard PN-EN 55022.	
Safety requiring	According to the PN-EN60950 norm.	
Environment	Commercial and light industrial.	
Enclosure		
Dimensions	53mm x 90mm x 58 mm,	
Material	Noryl UL. 94 V-O	
Degree of casing protection	IP40	
Degree of terminal protection	IP20	
Weight	0,10 kg	
According to standard	DIN EN50022, DIN EN43880	
Storage and transportation conditions		
Storage temperature	-40 ÷ +70 °C	
Humidity	5 ÷ 95% - non-condensing	

Dear Customer,

Thank you for purchasing **CEL-MAR Company** products.

We hope that this user manual helped connect and start up the **ADA-4028LA converter**. We also wish to inform you that we are a manufacturer of the widest selections of data communications products in the world such as: data transmission converters with interface RS232, RS485, RS422, USB, Current Loop, Fibre-Optic Converters and Ethernet or Wi-Fi.
Please contact us to tell how you like our products and how we can satisfy you present and future expectation.

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